ReadySystem™ 1U
Users Guide

P/N 5001791A Revision B

Notice Page

NOTICE

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REVISION HISTORY

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A, A	Initial Release	Jan/06
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Audience Assumptions

This guide is for the person who designs or uses computer related equipment, including but not limited to hardware and software design and implementation of the same. Ampro Computers, Inc. assumes you are qualified in designing and implementing your hardware designs and its related software into your prototype computer equipment.

Contents

List of Figures

List of Tables

Chapter 1 Setting Up the ReadySystem 1U

About the ReadySystem 1U

The ReadySystem™ products are intended for users of turn-key embedded systems, who prefer long lifecycle, configuration controlled computers over desktop grade systems with frequently changing motherboards. ReadySystem models feature the ReadyBoard single board computer (SBC), from the 400 MHz Intel Celeron® CPU to the Intel 1.4 GHz Pentium® M 738 CPU. The desired operating system (OS) is pre-loaded onto the internal 40 GB (or greater) 2 ½" hard disk drive (HDD). Just load your application software and you are ready to use your system applications.

Using this Guide

This guide provides the most efficient way to set up your ReadySystem 1U with your desired Operating System (OS). The instructions provided in this guide include:

- Removing the ReadySystem™ 1U from the shipping container and inventorying the accessories
- Connecting peripherals to the ReadySystem 1U
- Powering up the ReadySystem 1U

Information not provided in this Users Guide includes:

- ReadyBoard model specifications
- Environmental requirements
- ReadyBoard model connector/pin numbers and definitions
- Operating System programming, or operating instructions

NOTE	Refer to the specific Ampro OS manual or the OS manufacturer's manual for instructions when using the OS software.

Requirements

The following peripherals and devices are needed to make full use of the ReadySystem 1U.

- Peripherals (Customer provided):
  - PS/2 Keyboard and PS/2 Mouse
  - CRT (VGA) Monitor
- Power Cord and AC-DC Adapter (Ampro or Customer provided):
  - AC to DC (+12 VDC or +24 VDC) *Brick* Power Adapter (with screw-type mating connector)

CAUTION	The ReadySystem 1U only accepts 12VDC or 24VDC power. Voltages other than 12 or 24 will damage the system.

- Optional Devices/Connections (Customer provided):
  - Ethernet (LAN) connection
  - USB Devices, including a keyboard and mouse

What's in the Box

The Contents List identifies items in the shipping container of the ReadySystem 1U QuickStart Kit. Production quantities of the ReadySystem 1U, except for the first of multiple boxes, may not contain all of the optional items listed for the QuickStart Kit, but all boxes will have the standard items such as the mounting hardware and the PS/2 Y-cable. The optional items, such as the power adapter, power cords, and rack mount kit may be shipped separately. See Figure 1-1.

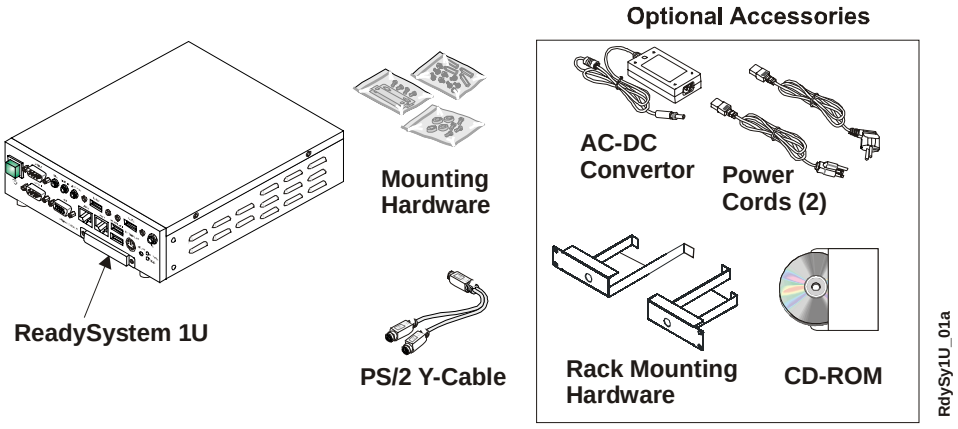


Figure 1-1. ReadySystem 1U Accessories

Setup Steps

It is important to follow the setup steps in this section in the exact order listed here, but skip any steps that do not apply to your situation. References are provided to chapters within this guide or other Ampro manuals for more information about installation and use of this ReadySystem 1U.

Preparations

1) Open shipping box	• Locate the ReadySystem 1U Contents List. See Figure 1-1. • Unpack the contents of the shipping box.
2) Verify Contents	• Verify the contents of the shipping box against the Contents List included with your ReadySystem 1U shipping box. • If anything is missing or damaged, call your sales representative. Refer to Appendix A for contact information.
3) Support Documentation (ReadyBoard model Documentation and Support Software (Doc & SW) CD-ROM located in the first QuickStart Kit)	*ReadySystem 1U Users Guide* This document describes how to setup and power up the ReadySystem 1U and is provided on the ReadyBoard model Doc & SW CD-ROM as a PDF file.
	ReadyBoard Model Reference Manual This document describes the ReadyBoard model used in the ReadySystem 1U enclosure and provides detailed reference information for your ReadyBoard and is located on the ReadyBoard model Doc & SW CD-ROM as a PDF file
	ReadyBoard Model QuickStart Guide This document describes how to setup, install, and power up the ReadyBoard model installed inside the ReadySystem 1U enclosure and is located on the ReadyBoard model Doc & SW CD-ROM as a PDF file.
	Operating System Manual(s) These documents describe how to use the desired operating system (OS) with the ReadySystem 1U and provide more detailed programming and operating information. These documents may or may not be provided with ReadySystem 1U depending on the specific licensing requirements.

Setting Up the Workspace

CAUTION	To prevent damage to the ReadySystem 1U, ensure there is sufficient clearance around the air vents for unrestricted airflow. The air temperature inside the enclosure could rise above the specified operating temperature limits if the airflow through the vents is restricted.

4) Select workbench location	• The workbench location should be a flat clean surface for setup and operation (including the connection of any external peripherals and optional devices). • Ensure sufficient airflow clearance exists around the complete enclosure.
5) Unpack ReadySystem 1U	• Remove the ReadySystem 1U from its shipping container and place it on a flat work surface. The ReadyBoard model and the hard drive with the desired OS pre-installed form a complete system ready for operation.

Installing the Mounting Hardware

6) Connect the appropriate mounting hardware	• Connect the mounting hardware for surface mounting to the bottom or rear of the ReadySystem 1U. See Figure 1-2. The four plastic feet are mounted prior to shipment and will protect the paint finish on the bottom of the enclosure. Optional rack mount brackets are available for mounting the ReadySystem into the standard *1U* rack mounting space.

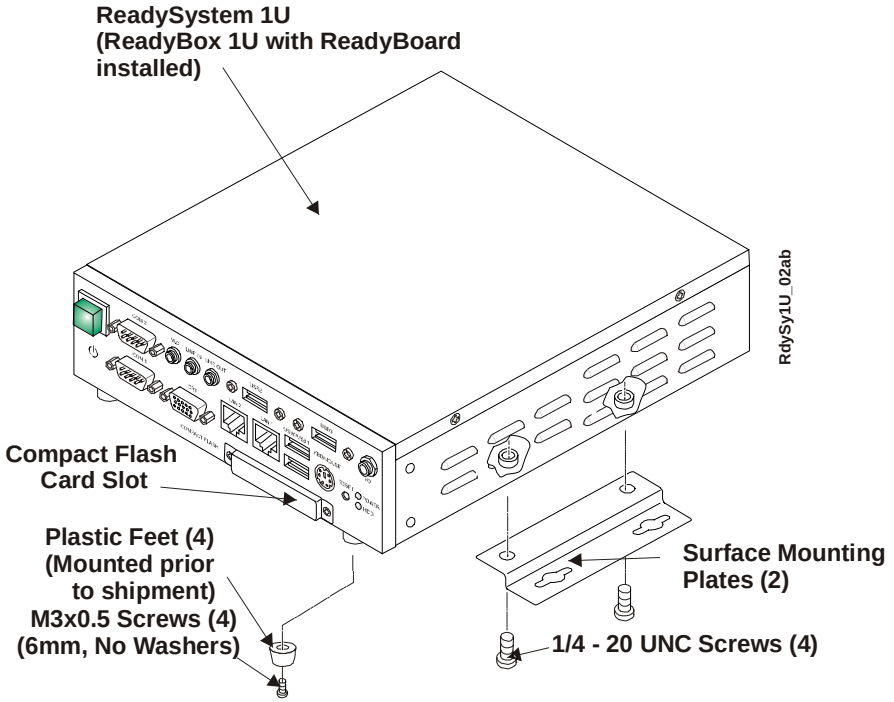
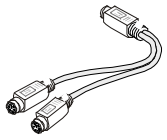
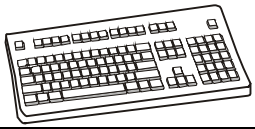
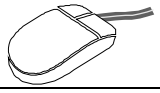
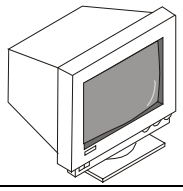


Figure 1-2. Installing Mounting Hardware

NOTE	All M3 screws use 0.5 mm pitch expressed as M3x0.5 in this manual. Metric thread designations use pitch in place of the more familiar USA method of threads per inch.

Connecting the Peripherals

7) Connect the Y-cable and the respective peripheral cables/ devices	• This includes the Y-cable for the PS/2 keyboard & mouse. Refer to Figure 1-3 and Table 1-1 for location and description of the connectors and controls.
	• Connect the PS/2 Keyboard & Mouse Y-cable assembly to the Keyboard/Mouse port on the ReadySystem 1U I/O Panel. See Figure 1-3. This cable assembly provides two connectors for the PS/2 Keyboard and PS/2 Mouse shared port with icons for the specific device.
	• Connect the keyboard to the free Y-cable connector with keyboard icon on it.
	• Connect the PS/2 mouse to the Y-cable connector with the respective mouse icon.
	• Connect the CRT (VGA) monitor through its 15-pin cable to the CRT (VGA) connector on the I/O Panel of the ReadySystem 1U. See Figure 1-3.

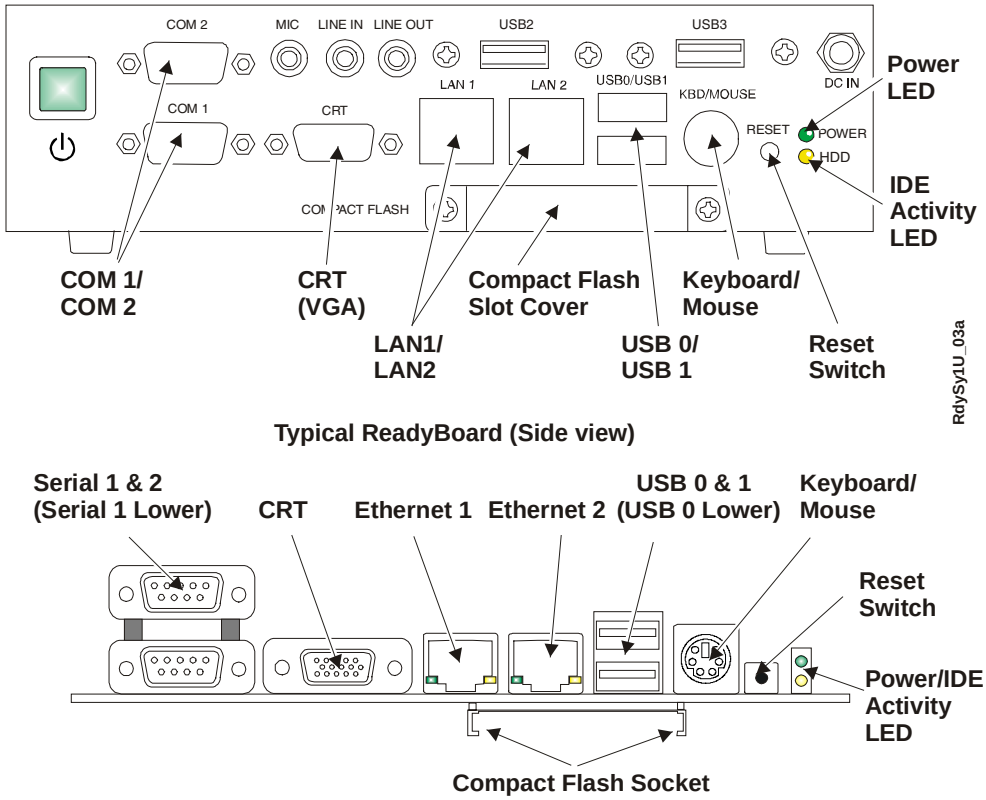


Figure 1-3. I/O Panel Controls, Connectors, and Indicators

NOTE	ReadyBoard models with only one Ethernet connector (LAN 1) have a cover over the LAN 2 Port.

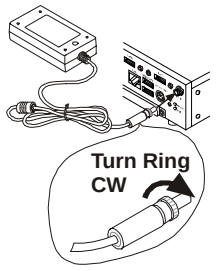
Table 1-1. I/O Panel Connectors, Controls, and Indicators

Control/Connector	Description
Power Switch	This momentary push button Power Switch controls DC power and has an internal 2-wire cable, 5-pin connector attached to the ReadyBoard.
DC IN	This 2-pin coaxial connector is connected to the internal DC regulator and accepts 12 VDC or 24 VDC +/- 5% from an AC-to-DC converter (*Brick* power supply) or a customer provided DC power supply with compatible cord.
CRT (VGA)	Use this standard 15-pin (DB15) connector for the video connection. This connector is provided on the ReadyBoard.
Keyboard/Mouse	Use this PS/2 connector for Keyboard & Mouse connections through the required PS/2 Y-cable adapter provided in the ReadySystem 1U QuickStart Kit or shipping container. The Y-cable has icons for the respective mouse or keyboard connection. This PS/2 connector is on the ReadyBoard.
USB 0 & 1	Use these two USB 4-pin connectors for the first two USB devices connected to the ReadySystem 1U. These USB type A connectors are on the ReadyBoard.
USB 2 & 3	Use these two USB 4-pin connectors for any additional USB devices. These USB connectors and the respective internal cables are connected to the ReadyBoard installed inside the enclosure.
LAN 1 (Ethernet 1)	This Ethernet port is typically used for the 10/100BaseT Ethernet connection. This 8-pin (RJ45) connector is provided on the ReadyBoard.
LAN 2 (Ethernet 2)	This Ethernet port is typically used for the Gigabit Ethernet (10/100/1000BaseT) connection, if provided on the ReadyBoard model (10-pin RJ45 connector). If not, it uses the standard 8-pin RJ45 connector for 10/100BaseT Ethernet. This connector is provided on the ReadyBoard. This port is covered for single Ethernet ReadyBoard modules.
COM 1 & COM 2 (Serial 1 & Serial 2)	Use these two 9-pin (DB9) serial ports for the standard RS232 connections to the ReadySystem 1U. These two connectors are provided on the ReadyBoard.
AUDIO: MIC, Line In, Line Out	Use these three Audio In/Out connectors for the standard Stereo In/Out and MIC in connections to the ReadySystem. These Audio connectors and the respective internal cables are connected to the ReadyBoard installed in the enclosure.
Power-On LED	This green power-on indicator, located on the ReadyBoard, glows when power is turned on and goes dark when power is turned off to the ReadySystem 1U.
HDD Activity LED	This yellow activity indicator, located on the ReadyBoard, flickers when there is I/O activity for the IDE HDD or compact flash card used with the ReadySystem.
Reset Button	Press this reset button momentarily (located on the ReadyBoard) to reset the ReadySystem (hard reset).
Compact Flash Cover and Slot	This compact flash cover and slot (not shown) protects the compact flash card if installed, and ensures good EMI shielding for the ReadySystem 1U.
Compact Flash Socket	The compact flash socket (not shown) is provided on the underside of the ReadyBoard and accepts the compact flash card, if installed, through the opening in the I/O panel of the ReadySystem 1U.
Hard Disk Drive (2 ½")	The rear panel assembly holds a 40 GB (or greater), 2 ½" hard disk drive (HDD) installed inside the enclosure and connected to the ReadyBoard.

NOTE If you wish to connect a floppy disk drive (FDD) or CD-ROM to the ReadySystem 1U, you can use one of the USB ports to connect the device.

Applying Power to the ReadySystem 1U

8) Power up the ReadySystem 1U



- Connect the DC power adapter or customer supplied DC supply into DC IN jack of ReadySystem 1U. See Figure 1-3.

NOTE Power supplied to the unit must be within the allowed +12VDC +/- 5% or +24VDC +/-5%. Failure to provide proper power may damage the system and void the warranty.

- Plug the CRT monitor's power cord into an AC outlet, and turn on the monitor. See Figure 1-3.
- Plug the DC power adapter or DC supply into an AC outlet.
- Press the ReadySystem 1U's momentary power switch (≈ 1 sec) before continuing. See Figure 1-3 and Table 1-1.

9) Verify the ReadySystem 1U powers on satisfactorily

- If you want to enter the BIOS Setup before the operating system loads, press the <Del> key during POST at the prompt.

  Use BIOS Setup during the initial boot to set the desired options (including time and date, etc.).
- You should see POST complete successfully before the system starts loading the operating system. If you are using Linux, the boot loader will appear first, similar to the one shown below with the desired OS name displayed.

NOTE The 40 GB (or greater) hard disk drive (2 ½") installed in the ReadySystem 1U enclosure comes with three partitions for the OS and swap space.

(The Linux 2.6 OS is shown as an example.)

GNU GRUB version 0.95 (632k lower/250768 upper memory)

Fedora Core (2.6.9-xxx)

RdySy1U_4a

Use the ↑ and ↓ keys to select which entry is highlighted. Press Enter to boot the selected OS, 'e' to edit the commands before booting, 'a' to modify the kernel arguments before booting, or 'c' for a command-line.

NOTE The GNU GRUB boot loader screen will continue to display indefinitely, unless you execute one of the listed options.

10) Using the Operating System (OS)

- You should see a prompt of some kind indicating the OS is loading, or has loaded, as you view the screen at this point.
- If you are required to log into the OS, use *root* for the admin name and *software* as the password to log on. If you are logging in as a normal user, use *software* for the name and password.
- Refer to the desired OS manual (Ampro's or OS Manufacturers), that may or may not be provided with the ReadySystem, (depends on licensing agreements) for more information.
- If you require drivers not installed on the HDD (2½") located inside the ReadySystem, refer to ReadyBoard model Doc & SW CD-ROM for additional drivers and instructions.

Chapter 2 Installing ReadySystem 1U Options

The procedures in this chapter describe how to install or remove the ReadySystem 1U supported options. This includes removing/installing the compact flash card and its cover, as well as removing the ReadyBoard model SBC from the ReadySystem 1U enclosure and removing/installing memory.

NOTE	The ReadyBoard 700 is used in these ReadyBoard examples, but you will need to refer to the specific documentation for your ReadyBoard model to locate and identify the jumper and connector locations. Refer to the ReadyBoard model QuickStart Guide or the ReadyBoard model Reference Manual for more specific installation/removal information than is provided in this Chapter.

Compact Flash Card Installation

This brief procedure describes how to remove the protective cover from the compact flash opening in the I/O panel and installing the compact flash card into the open slot. Refer to the ReadyBoard model documentation for specific compact flash jumper settings and compatibility.

NOTE	You may use compact flash cards (Type I or II) from commercial vendors. Ensure you verify the firmware bit status, DMA or UDMA compatibility of the compact flash card before purchasing. Not all card vendors define or support these parameters. Consult the ReadyBoard product Hardware Release Notes and your compact flash card vendor for these parameter compatibilities.

Tools Required

Use these tools to remove and install the compact flash card into or out of the ReadySystem 1U.

- Small to medium Phillips screwdriver
- Anti-static service kit - Use a complete anti-static service kit (or the equivalent) to remove or install the compact flash card. A complete anti-static service kit should include a static-dissipating work surface, a chassis clip lead, and a wrist or ankle strap.

Installing the Compact Flash Card

1. Prepare the ReadySystem 1U for compact flash (CF) card installation:
   - If the ReadySystem is already prepared for compact flash installation, including removal of the CF cover, with power turned off and the coaxial power cable disconnected, skip to Step 5.
   - If the ReadySystem has power applied and is operating, continue with the next step.

CAUTION	To prevent damage to the ReadyBoard, ensure the power switch on the ReadySystem is turned off, and the coaxial power cable has been disconnected from the DC IN connector.

2. Initiate a shut down sequence through the OS, or hold in the power switch for 4-6 seconds to turn off power.

   The Power LED should turn off completely when the power is turned off.

3. Disconnect the coaxial power cable from the DC IN connector.

CAUTION	To prevent damage to the ReadyBoard or the compact flash card, ensure you discharge yourself and follow good Electrostatic Discharge principals before touching components. The ReadyBoard and the compact flash card are sensitive to static electricity and easily can be damaged by improper handling. Do the following when handling either one: Always use an anti-static wrist/ankle strap and a grounding mat. Leave the compact flash in the anti-static bag until you are ready to install it. Before you remove a compact flash from the anti-static bag, touch a grounded, unpainted metal surface to discharge any static electricity.

4. Use a Phillips screwdriver to remove the compact flash cover and place the two screws in a safe place for use later. See Figure 2-1.
5. If necessary, inspect the socket for bent pins or debris on the pins of the compact flash socket.
6. Remove the compact flash card from its protective bag, handling the compact flash card by its edges.

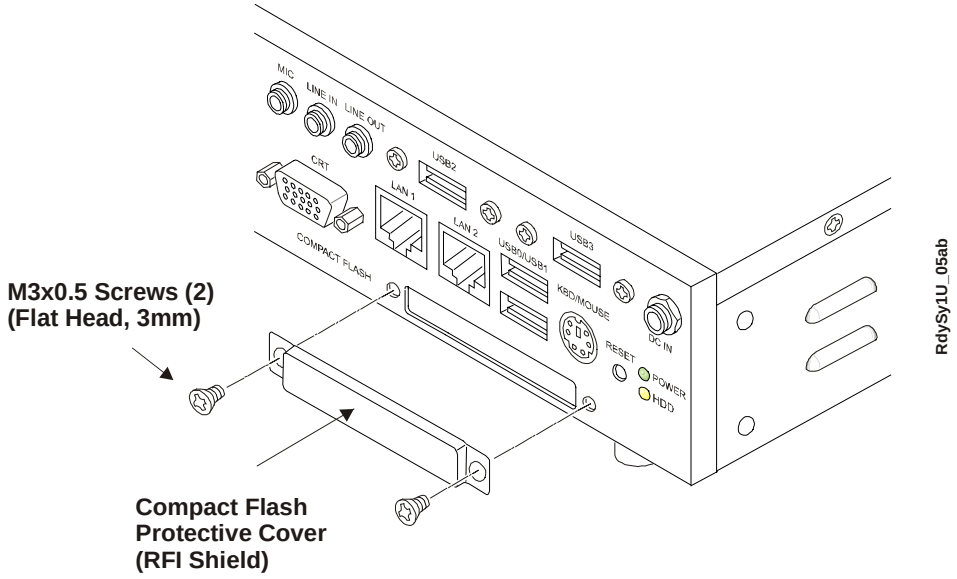


Figure 2-1. Removing Compact Flash Protective Cover

CAUTION	To prevent damage to the ReadyBoard or the compact flash card, do not force the compact flash card into the slot. If you have to force the compact flash card into the slot, it is not installed correctly. The guides on the compact flash sockets on the ReadyBoard series have enough flexibility to expand when the CF is installed incorrectly.

7. Insert the compact flash card into the opening provided by matching the pin-1 orientation of the compact flash card with the arrowhead on the I/O panel. See Figure 2-2.

NOTE	The keyed slots and lip (or catch edge) on the compact flash card are used to install into the socket in only one orientation. Pin-1 should be down and to the right as shown in the Figure 2-2.

8. Push the compact flash card into the opening until it firmly seats into the socket and mates with the pins. See Figure 2-2.

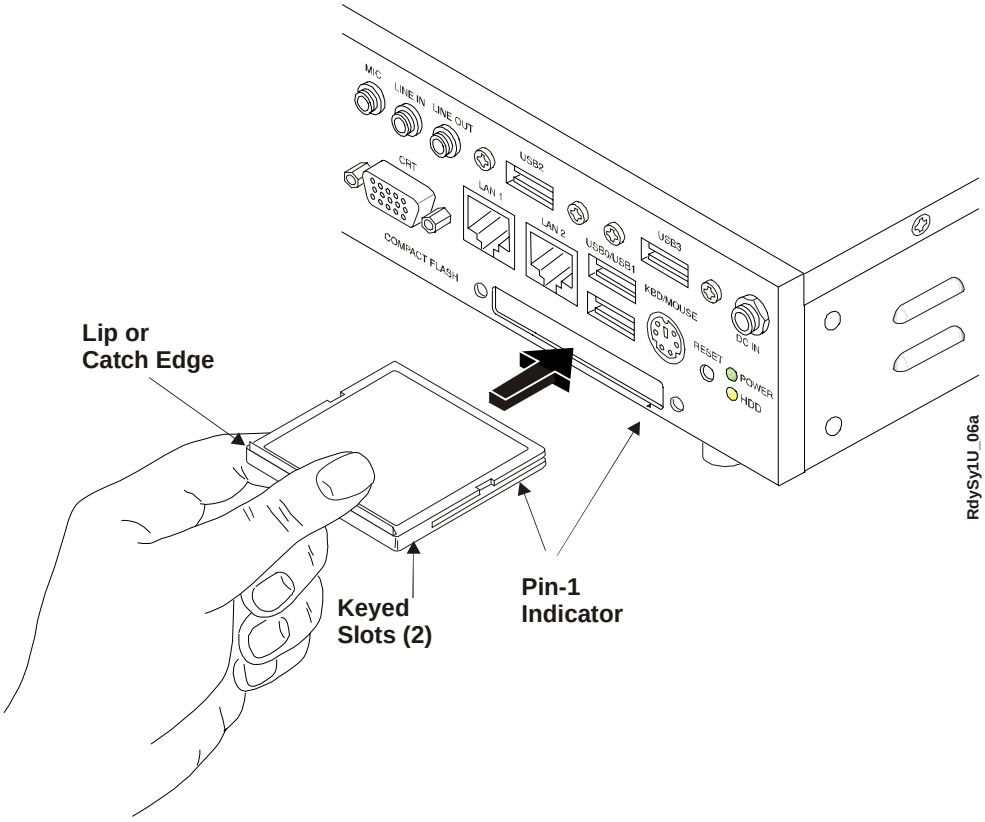


Figure 2-2. Installing Compact Flash Card

9. If your application or environment requires protection of the compact flash card, for security or EMI protection, you can re-install the protective cover over the compact flash card. See Figure 2-1.

   Reconnecting the protective cover will provide full EMI protection.

10. Refer to the specific ReadyBoard documentation for any required jumper settings for the compact flash card, before restoring power to the ReadySystem 1U.

CAUTION	Depending on BIOS Setup, some ReadyBoard products will power on as soon as you connect DC power to the system.

Removing the Compact Flash Card

To remove the compact flash card from the ReadySystem 1U through the enclosure opening, simply reverse the installation procedure and follow all of the safety precautions listed.

ReadySystem 1U Disassembly/Re-Assembly

Accessing the bottom of the ReadyBoard, where the SODIMM memory is installed, requires removing the ReadyBoard from the ReadySystem 1U enclosure. The following procedures described how to remove and re-install the ReadyBoard into the ReadySystem 1U enclosure.

NOTE	Some of the cables or components, including the ReadyBoard, may not be shown in the following figures to simplify the figure and improve clarity.

Tools Required

Use these tools to install and remove the ReadyBoard into or out of the ReadySystem 1U enclosure.

- Small to medium Phillips #2 screwdriver.
- Anti-static service kit - Use a complete anti-static service kit (or the equivalent) to remove or install the ReadyBoard. A complete anti-static service kit should include a static-dissipating work surface, a chassis clip lead, and a wrist or ankle strap.

Removing the ReadyBoard from Enclosure

1. Prepare the ReadySystem 1U for the ReadyBoard removal.
   - If the ReadySystem is already prepared for ReadyBoard removal, with the top cover removed, power turned off, and the coaxial power cable disconnected, skip to Step 5.
   - If the ReadySystem has power applied and operating, continue with the next step.

CAUTION	To prevent damage to the ReadyBoard, ensure the power switch on the ReadySystem is turned off and the coaxial power cable has been disconnected.

2. Initiate a shut down sequence through the OS, or hold in the power switch for 4-6 seconds to turn power off.

   The Power LED should turn off completely when the power is turned off.
3. Disconnect the coaxial power cable from the DC IN connector of the I/O panel.
4. Remove the top cover from the ReadySystem enclosure.
   a. Remove the six screws from the enclosure cover and slide the top cover to the rear.
   b. Lift the top cover up and away from the enclosure. See Figure 2-3.
   c. Set aside the top cover for later re-installation.

CAUTION	To prevent damage to the static sensitive components on the ReadyBoard, ensure you follow good Electrostatic Discharge principles. Components on the ReadyBoard are sensitive to static electricity and can be easily damaged by improper handling. Do the following when handling the ReadyBoard: Always use an anti-static wrist/ankle strap and a grounding mat. Before you handle the ReadyBoard, touch a grounded, unpainted metal surface to discharge any static electricity.

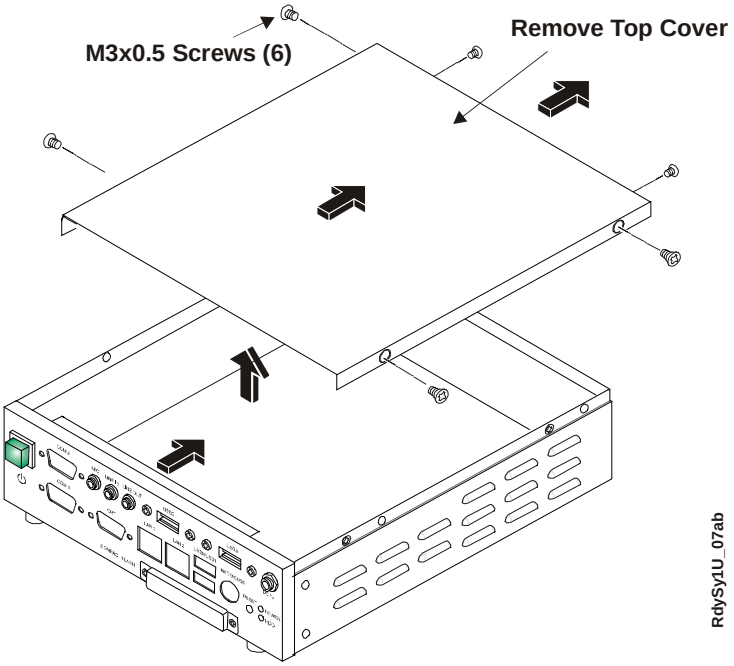


Figure 2-3. Removing ReadySystem Top Cover

5. If necessary, remove or loosen the four screws holding the two USB cables (USB 2 & USB 3) to the enclosure I/O Panel. See Figure 2-4.

   You might be able to just loosen the two USB connectors (USB 2 & USB 3) to free the ReadyBoard from the enclosure because of the tight fit between the two USB connectors and the tops of the Ethernet ports. If not, you will have to remove the two USB connectors (USB 2 & USB 3) from the enclosure. See Figure 2-4.

6. If necessary, remove the two USB cables (USB 2 & USB 3) connected to the enclosure I/O Panel. See Figure 2-4.

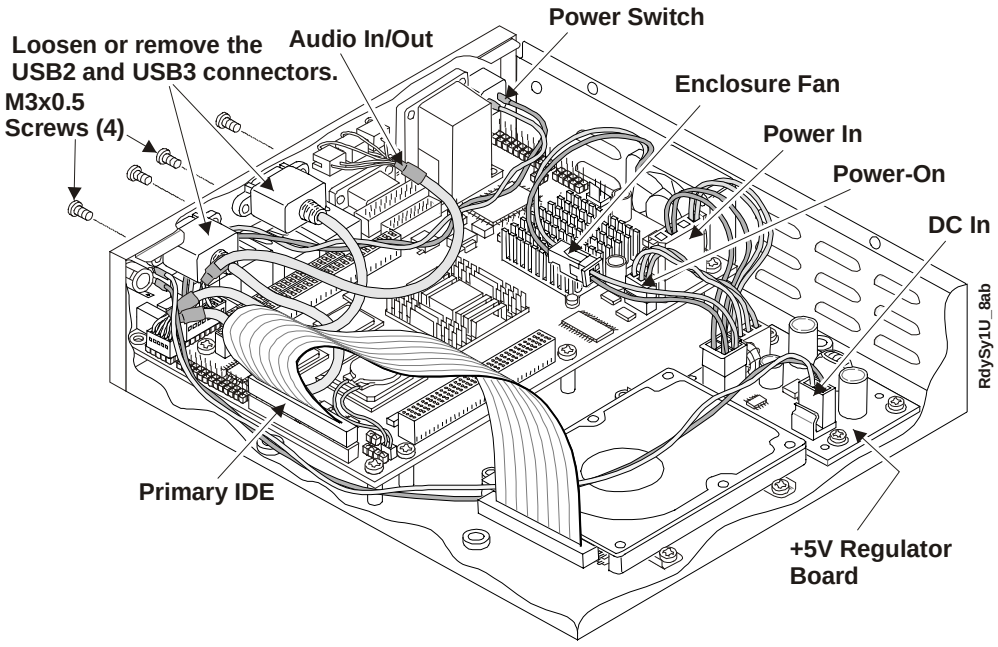


Figure 2-4. Removing USB Connectors

7. Disconnect all of the remaining cables from the ReadyBoard, before continuing. See Figures 2-4, 2-5, and 2-6.

   To remove the ReadyBoard from the enclosure with greater freedom, you may find it necessary to disconnect any cables between the +5 volt regulator and the internal parts of the ReadySystem.

   Refer also to the respective ReadyBoard QuickStart Guide for more cable removal information.

8. Remove all screws (8) holding the ReadyBoard to the enclosure standoffs. See Figure 2-5.

9. Slowly work the ReadyBoard to the rear of the enclosure until it is safely clear and place it on a protective surface. See Figure 2-5.

   Place the ReadyBoard on a protective surface for SODIMM removal/replacement.

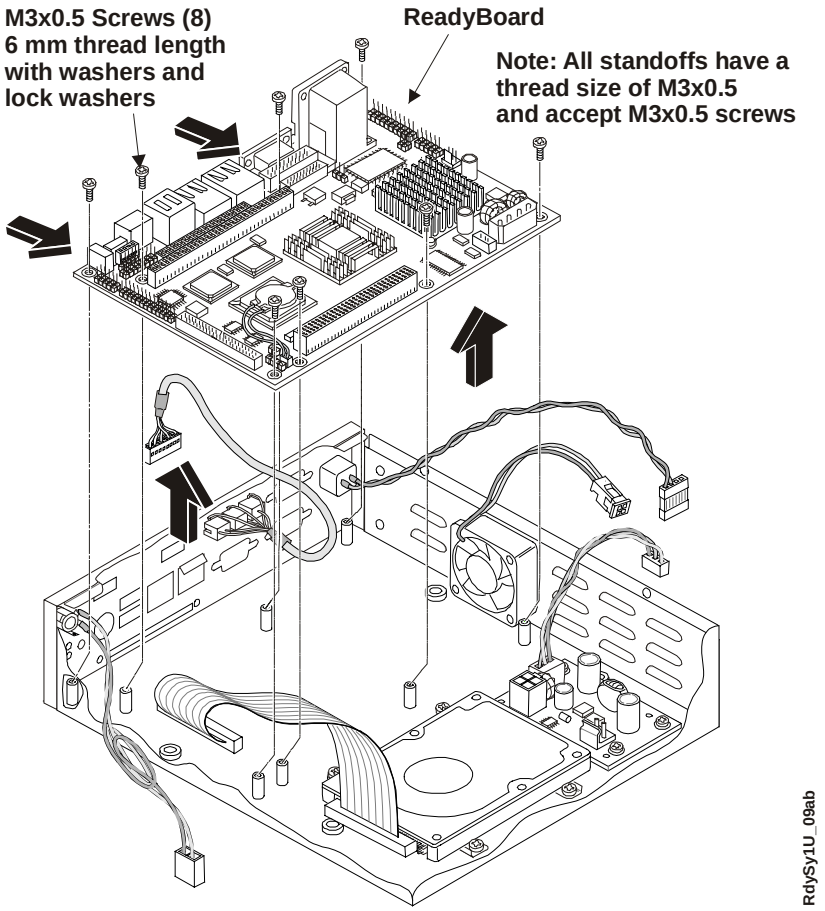


Figure 2-5. Removing ReadyBoard from Enclosure

Installing the ReadyBoard into the Enclosure

1. Prepare the ReadySystem for ReadyBoard installation.

   - If the ReadySystem is already prepared for ReadyBoard installation with the top cover removed, a SODIMM installed, and the coaxial power cable disconnected, skip to Step 6.

     This includes installing the correct size SODIMM onto the ReadyBoard, since you will not have access to the SODIMM socket once the ReadyBoard is installed into the ReadySystem.

   - If the ReadySystem is not ready for the ReadyBoard installation, continue with the next step.

CAUTION	To prevent damage to the ReadyBoard, ensure the coaxial power cable has been removed from the DC IN connector of the I/O panel and the AC-DC adapter has been disconnected from the AC power source.

2. Disconnect the coaxial power cable from the DC IN connector of the I/O panel.
3. Remove any of the six screws still holding the top cover to the ReadySystem. See Figure 2-3.
4. Slide the top cover to the rear and lift it up and away from the ReadySystem.

   Set aside the top cover for later re-installation.
5. If you have not made the necessary changes to the ReadyBoard, including changing the SODIMM, do so now before continuing.

   Once the ReadyBoard is installed into the ReadySystem enclosure, you will not be able to access the SODIMM socket on the ReadyBoard.

   Refer to *Removing the SODIMM* and *Installing the SODIMM* procedures.
6. Move the internal cables out of the way to allow installation of the ReadyBoard. See Figure 2-6.
   - If you did not remove the two USB cables (USB 2 & USB 3) from the enclosure to remove the ReadyBoard, you need to do so before installing the ReadyBoard back into the enclosure.
   - If necessary, for greater access to the internal space of the ReadySystem, disconnect any cables between the +5 volt regulator and the internal parts of the ReadySystem. See Figures 2-4 & 2-6.

     Refer also to the respective ReadyBoard QuickStart Guide for more cable removal information.

CAUTION	To prevent damage to the static sensitive components on the ReadyBoard, ensure you follow good Electrostatic Discharge principles. Components on the ReadyBoard are sensitive to static electricity and can be easily damaged by improper handling. Do the following when handling the ReadyBoard: Always use an anti-static wrist/ankle strap and a grounding mat. Before you handle the ReadyBoard, touch a grounded, unpainted metal surface to discharge any static electricity.

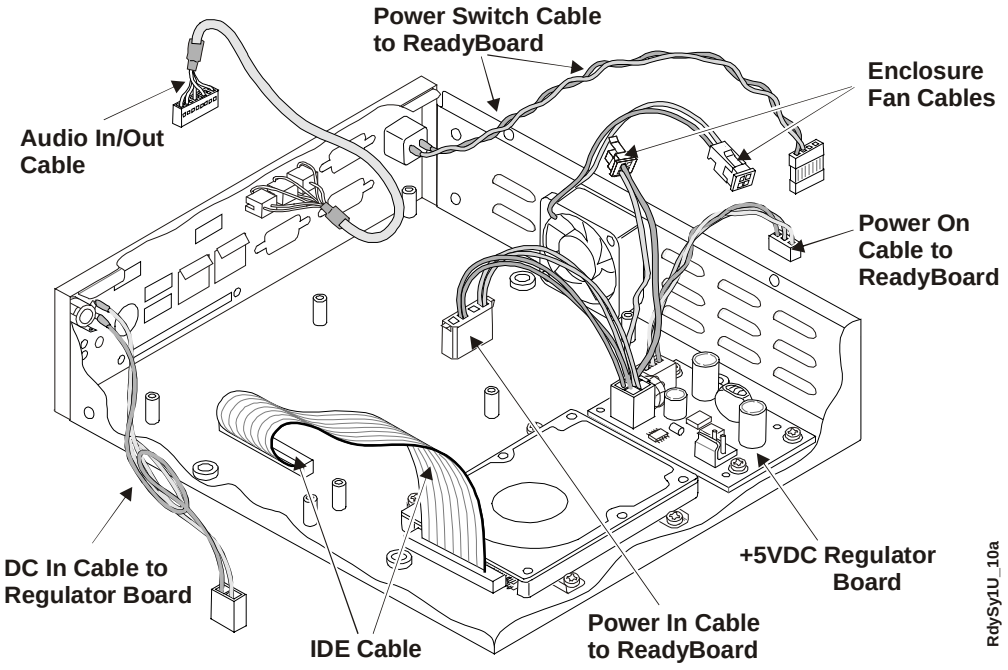


Figure 2-6. Internal Cables Shown Separated

7. Position the ReadyBoard near the eight standoffs on the enclosure base at about a 10° angle to the mounting surface. See Figures 2-7 and 2-8.
8. Insert the ReadyBoard and its LAN connectors just under the lip of the LAN port on the enclosure wall, behind the I/O panel. See Figure 2-7.
9. Slowly work the ReadyBoard into place, inserting the I/O connectors and LEDs into the respective openings on the I/O Panel.

   When you have the ReadyBoard in position you should clearly see the mounting holes for the eight standoffs under the board mounting holes, and the LEDs should fit into the openings provided on the I/O Panel.

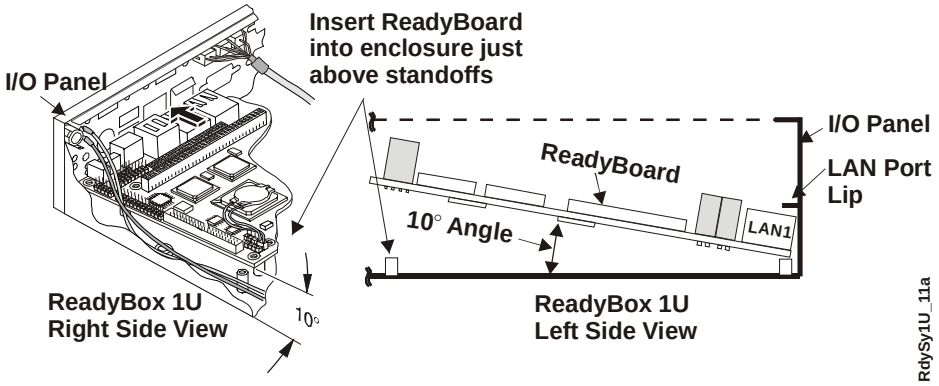


Figure 2-7. ReadyBoard Positioned Under LAN Ports

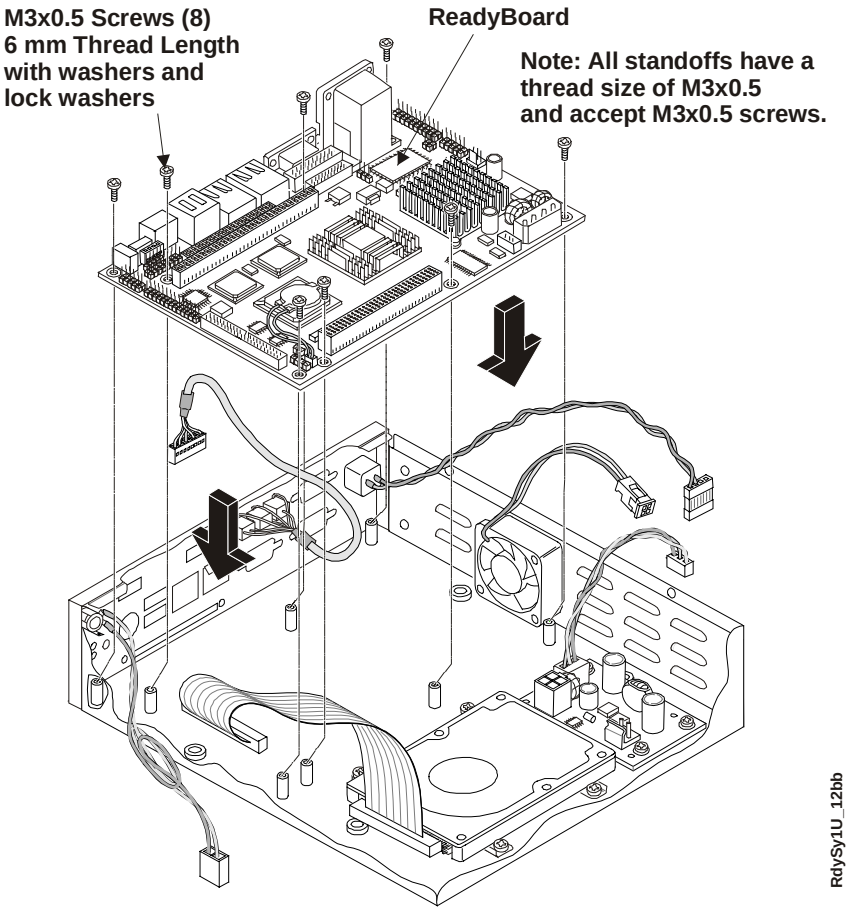


Figure 2-8. Installing ReadyBoard into Enclosure

10. Insert eight M30.5, 6mm screws with washers into the standoffs on the enclosure floor. See Figure 2-8.

Connecting the Power Cables

When connecting the cables, refer to the pin-1 designations shown in Figure 2-10. Pin-1 is shown as a black pin (round or square) at the connectors and jumpers, unless otherwise noted. If you desire more installation information than is provided in this guide refer to the ReadyBoard model QuickStart Guide or Reference Manual.

NOTE	The connector reference designators in the text and illustrations are based on the ReadyBoard 700 and may be different from your respective ReadyBoard product, but the functions will be the same and the connector locations will typically be in the same area.

1. Connect the Power Switch (two-wire) cable to the Utility connector (pins 1 & 2) on the ReadyBoard, matching the red wire with pin-1. See Figures 2-9, 2-10 and 2-11.

   The Utility connector placement differs slightly on the various ReadyBoards, but all Utility connectors use a 5-pin header and are in the general area shown in Figure 2-10. Refer to the respective ReadyBoard documentation for any variations, but match the red wire with pin-1.

2. Connect the Power In cable to the Power In connector (J4). See Figures 2-9, 2-10 and 2-11.

   The Power In connectors are located in the same place on all boards and use a 4-pin header.

3. Connect the Power-On cable to the Power-On connector (J6) on the ReadyBoard, as shown in Figure 2-11. See Figures 2-9 and 2-10.

   The Power-On (3-pin) connector placement differs slightly on the various ReadyBoards. Refer to the respective ReadyBoard documentation for any variations.

4. Connect the DC In cable to the +5 volt Regulator board. See Figure 2-11.

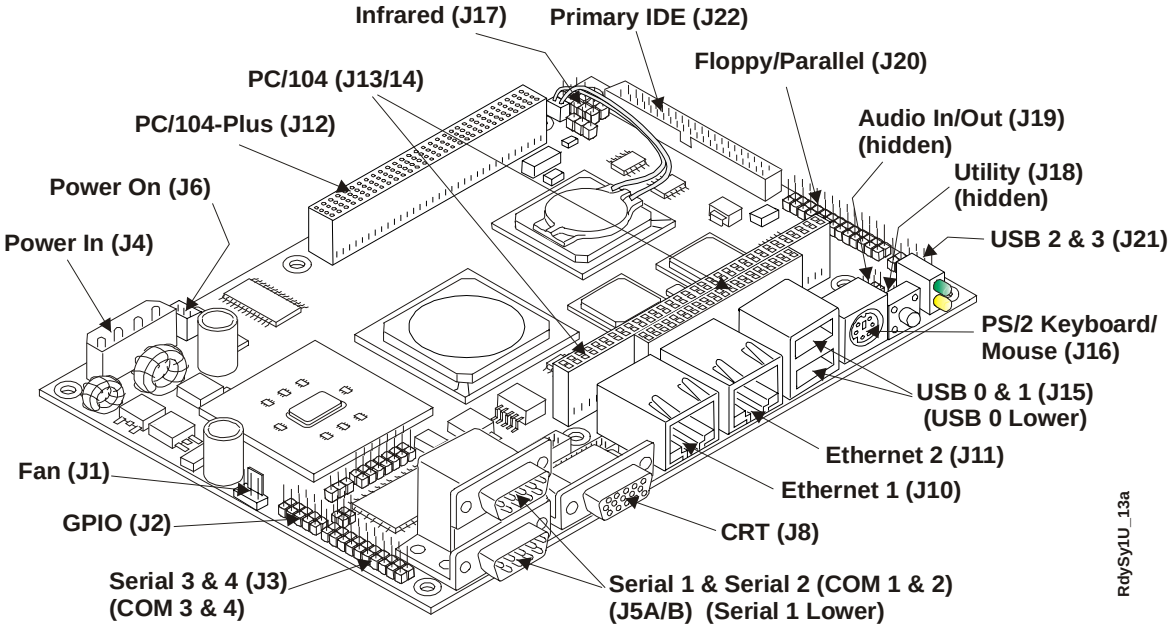


Figure 2-9. Connector Locations (Typical ReadyBoard)

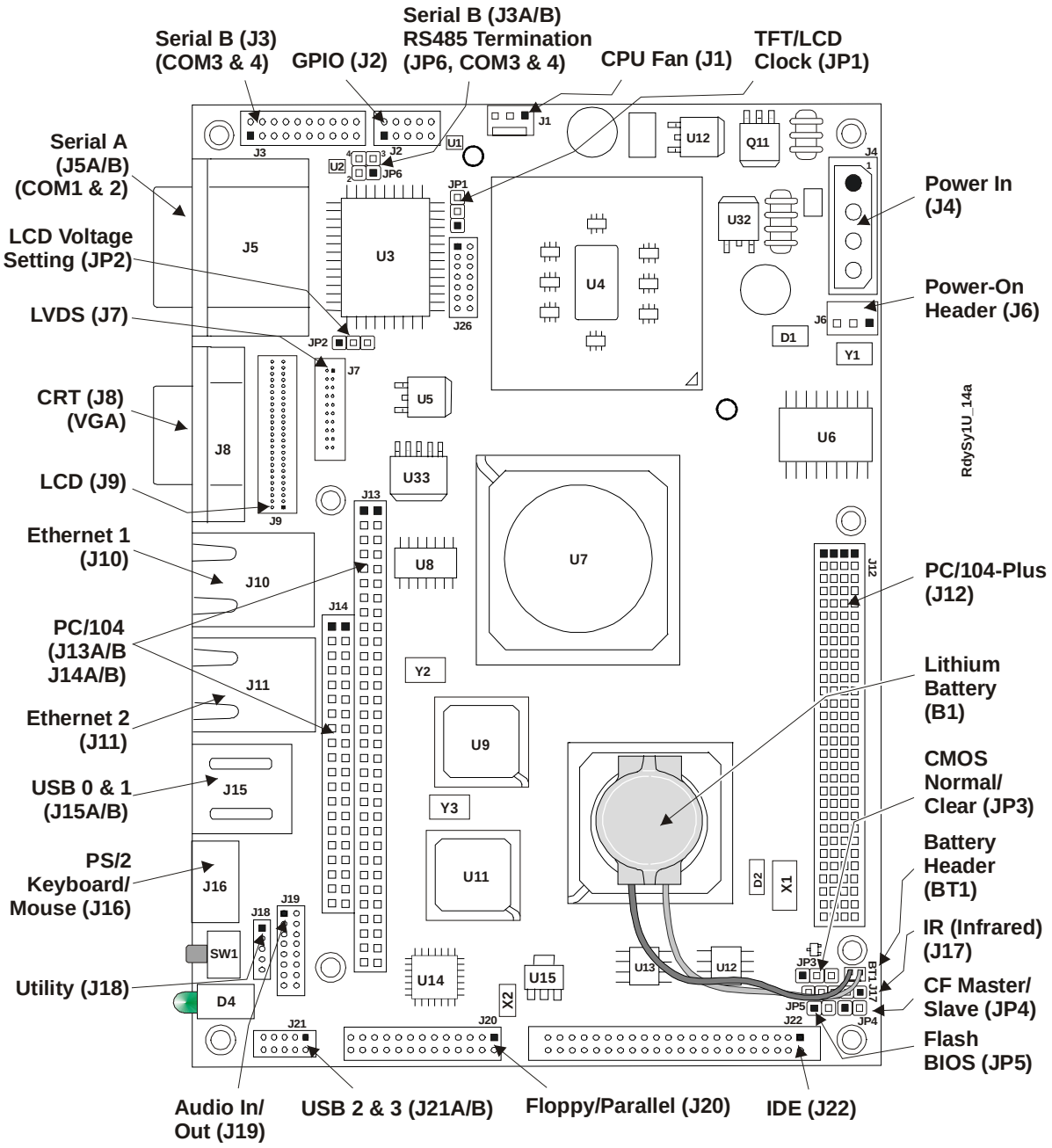


Figure 2-10. Connector and Jumper Pin-1 Locations (Typical ReadyBoard)

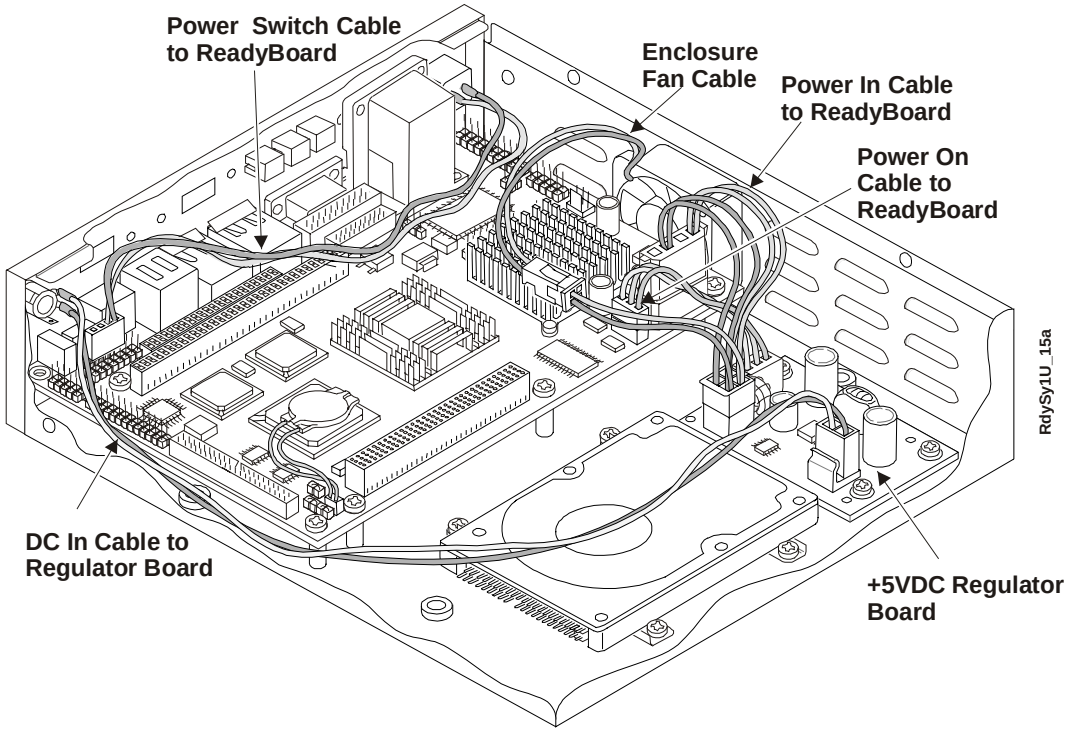


Figure 2-11. Installing Power Cables

Connecting the Remaining Cables

The following procedure describes how to install the remaining cables to the ReadyBoard. Refer also to the respective ReadyBoard QuickStart Guide for any variations to the board shown in the figures when connecting the cables to the ReadyBoard. Skip any cable(s) that do not apply to your situation.

NOTE	Ampro recommends using the cable routing shown in the figures. This will help to ensure cables and wiring do not come in contact with the heatsinks.

1. Reconnect USB2 & USB3 cables to the USB2 & USB3 openings in the I/O panel as shown in Figure 2-12.

   The USB 2 cable is always connected to pins 3 & 5 on the 10-pin connector and USB 3 is always connected to pins 4 & 6 on the 10-pin connector, regardless of the ReadyBoard model. This 10-pin connector has odd/even pin arrangement where all odd pins of the connector are on one side, while all even pins are on the opposite side of the connector.

2. Connect the USB2 & USB3 cable to the USB2 & USB3 (10-pin) connector (J21) on the respective ReadyBoard. See Figures 2-9, 2-10, and 2-12.

   All USB2 & USB3 connectors are located in the same place on the board and share the same 10-pin header. Refer to the respective ReadyBoard documentation for the pin-1 location.

3. Connect the Audio cable to the Audio In/Out (16-pin) connector on the respective ReadyBoard. See Figures 2-9, 2-10, and 2-12.

   The Audio In/Out (16-pin) connector placement differs slightly on the various ReadyBoards, but is in the same general area on the board. Refer to the respective ReadyBoard documentation for any variations and the pin-1 location.

4. Connect the IDE cable to the IDE connector (J22). See Figures 2-9, 2-10, and 2-12.
   - If you did not disconnect the IDE cable from the hard disk drive earlier, just connect the free end of the IDE cable to the IDE connector (J22) on the ReadyBoard.
   - If you also disconnected the IDE cable from the hard disk drive (HDD) earlier, then re-connect it to the IDE connector on the HDD. The red strip on the cable should match with pin-1 on the HDD and is typically located next to the jumper settings on the HDD. See Figure 2-12.

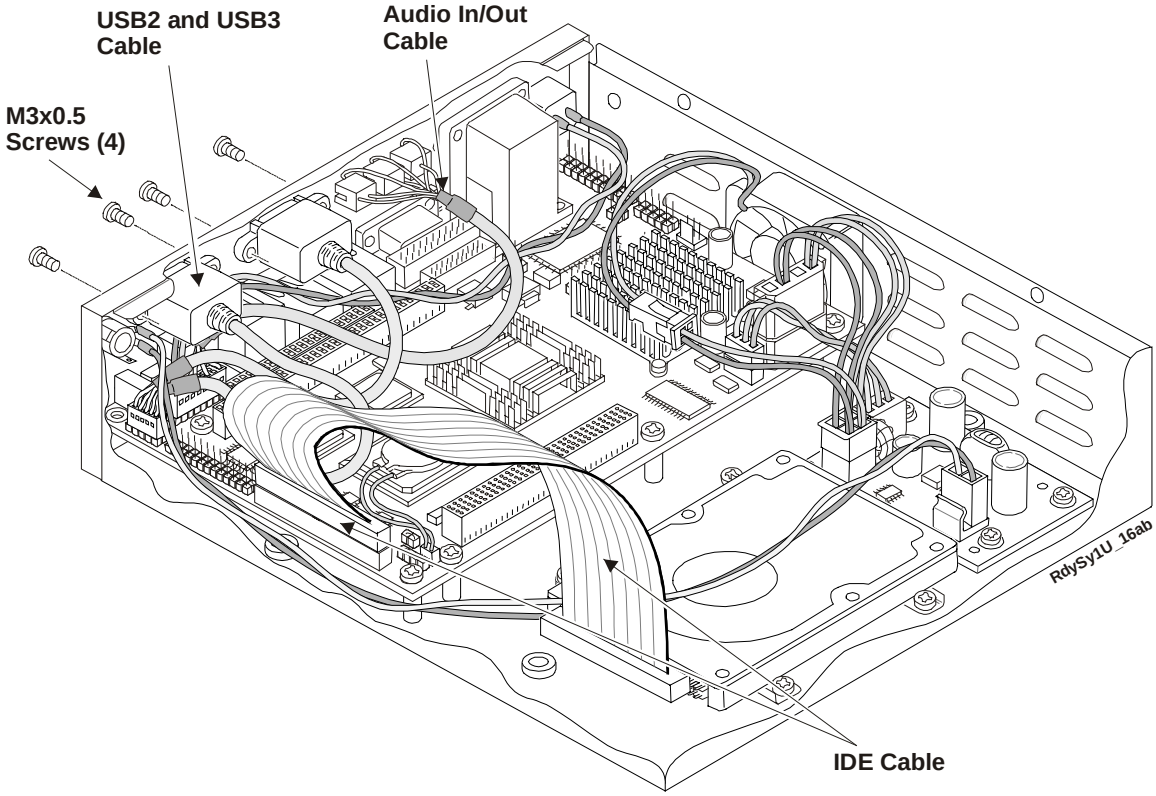


Figure 2-12. Installing IDE, Audio, and USB Cables

5. You may replace the top cover before restoring power to check the ReadySystem 1U operation, or restore power to check system operation before replacing the top cover to the enclosure.

   In either case, observe all safety precautions when replacing the top cover or restoring power to the system.

6. Follow the power-on procedures outlined in Chapter 1 to restore power to the ReadySystem.

CAUTION	Depending on BIOS Setup, some ReadyBoard products will power on as soon as you connect live DC power to the system.

Memory Installation

The ReadyBoard model uses a single SODIMM socket available on the underside of the board. The ReadyBoard SBC must be removed from the ReadySystem 1U enclosure to remove or install the single SODIMM.

NOTE	Refer to the specific ReadyBoard model QuickStart Guide or Reference Manual for SODIMM installation recommendations.

Tools Required

Use an anti-static service kit (or the equivalent) to remove or install the SODIMM. An anti-static service kit should include a static-dissipating work surface, a chassis clip lead, and a wrist or ankle strap.

Installation Guidelines

- When handling a SODIMM, observe anti-static discharge precautions to avoid damage.
- Refer to the specific ReadyBoard model QuickStart Guide or Reference Manual for SODIMM installation recommendations.
- The typical SODIMM sizes are available from Ampro: 64 MB, 128 MB, 256 MB, 512 MB, or 1 GB, depending on the supported memory size of the ReadyBoard model.
- The supported SODIMM memory size is ReadyBoard model specific.

Removing the SODIMM

Use this procedure to remove the SODIMM from the SODIMM socket on the ReadyBoard.

1. Prepare the ReadySystem 1U for SODIMM removal:
   - If the ReadyBoard model is already prepared for SODIMM removal, with the ReadyBoard removed from the enclosure, skip to Step 7.
   - If the ReadySystem has power applied and operating, continue with the next step.

CAUTION	To prevent damage to the ReadyBoard, ensure the power switch on the ReadySystem is turned off and the coaxial power cable has been disconnected from the DC IN connector.

2. Initiate a shut-down sequence through the OS, or hold in the power switch for 4-6 seconds to turn off the power.

   The Power LED should turn off completely when the power is off.
3. Disconnect the coaxial power cable from the DC IN connector.
4. Remove the six screws holding the top cover to the ReadySystem enclosure and then slide the cover to the rear as shown in the Figure 2-3.
5. Disconnect the cables to the ReadyBoard model and lay the free ends out of the way.
6. Remove the ReadyBoard model from the ReadySystem enclosure and place it on an anti-static surface.

   Refer to *Removing ReadyBoard from Enclosure* for more information.
7. Turn over the ReadyBoard model for access to the bottom of the board while laying it on a flat anti-static surface. See Figure 2-13.

CAUTION	To prevent damage to the SODIMM, do not touch the SODIMM until you have discharged yourself and followed good Electrostatic Discharge principals. The SODIMMs are sensitive to static electricity and can be easily damaged by improper handling. Do the following when handling a SODIMM: Use an anti-static wrist/ankle strap and a grounding mat connected to ground. Leave the SODIMM in the anti-static bag until you are ready to install it. Before you remove a SODIMM from the anti-static bag, touch a grounded, unpainted metal surface to discharge any static electricity.

8. Locate the SODIMM socket (DIMM1) on the bottom of the ReadyBoard model. See Figure 2-13.
9. Open both retaining latches to release the SODIMM from the socket. See Figure 2-13.

   The SODIMM will spring up to a 45° angle once you open both retaining latches. If the SODIMM does not spring up to a 45° angle, then the retaining latches have not released the SODIMM from the socket.
10. Using the card edges, lift the SODIMM completely away from the socket. See Figure 2-13.
11. Place the SODIMM on an anti-static surface or in an anti-static bag.

NOTE	If you remove the SODIMM and restore power without a SODIMM installed, you will not see a display, and your system will not work properly.

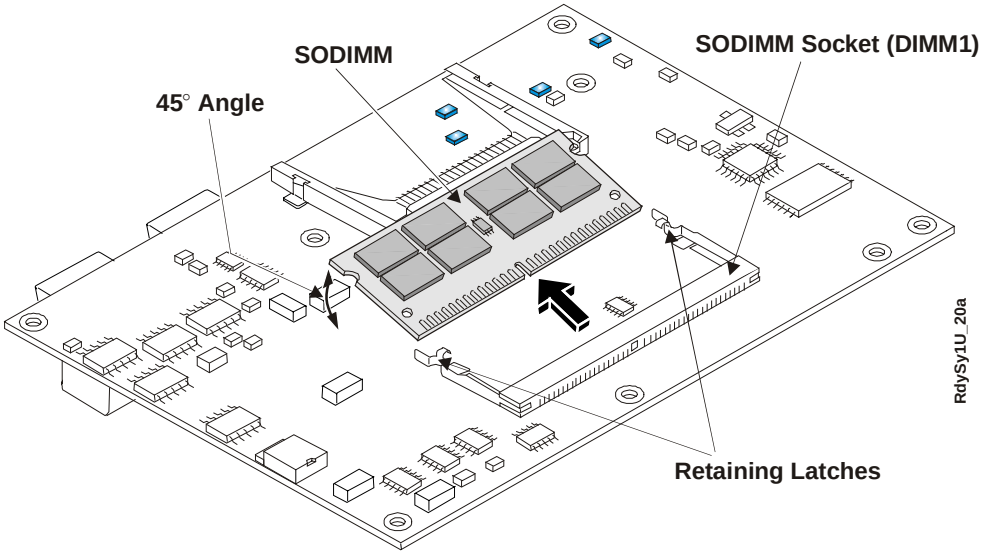


Figure 2-13. Removing SODIMM from Socket

Installing the SODIMM

If you want to install a larger size SODIMM or replace the existing SODIMM, refer to the following procedure.

1. Prepare the ReadyBoard model for SODIMM installation:
   - If the ReadyBoard model is already prepared for SODIMM installation, with the ReadyBoard removed from the ReadySystem enclosure, skip to Step 7. If the SODIMM socket is empty, skip to Step 9.
   - If the ReadySystem has power applied and operating, continue with next step.

CAUTION	To prevent damage to the ReadyBoard, ensure the power switch on the ReadySystem is turned off and the coaxial power cable has been disconnected from the DC IN connector.

2. Initiate a shut down sequence through the OS, or hold in the power switch for 4-6 seconds to turn off power.

   The Power LED should turn off completely when the power is turned off.

CAUTION	To prevent damage to the SODIMM, do not touch the SODIMM until you have discharged yourself and followed good Electrostatic Discharge principals. The SODIMMs are sensitive to static electricity and can be easily damaged by improper handling. Do the following when handling a SODIMM: Use an anti-static wrist/ankle strap and a grounding mat connected to ground. Leave the SODIMM in the anti-static bag until you are ready to install it. Before you remove a SODIMM from the anti-static bag, touch a grounded, unpainted metal surface to discharge any static electricity.

3. Disconnect the coaxial power cable from the DC IN connector.
4. Remove the six screws holding the top cover to the ReadySystem enclosure and then slide the cover to the rear as shown in Figure 2-3.
5. Disconnect the cables to the ReadyBoard model and lay the free ends out of the way.
6. Remove the ReadyBoard model from the ReadySystem enclosure and place the board on an anti-static surface.

   Refer to *Removing ReadyBoard from Enclosure* for more information.
7. Turn over the ReadyBoard model for access to the bottom of the board while laying it on a flat anti-static surface. See Figure 2-14.
8. If you need to remove the existing SODIMM from the SODIMM socket before continuing, refer to *Removing the SODIMM*, beginning with Step 9.

   Follow Steps 9 to 11 in the next procedure, *Removing the SODIMM*, before continuing with the next step in this procedure.
9. Remove the SODIMM from its protective bag, handling the SODIMM by its edges.

NOTE	Refer to the specific ReadyBoard model QuickStart Guide or Reference Manual for SODIMM installation recommendations.

10. Ensure there is nothing in the SODIMM socket that would prevent its installation.

11. Insert the SODIMM into the socket at a 45° angle to the bottom of the ReadyBoard model with the components facing up. See Figure 2-14.

    The SODIMM card edge and socket are keyed to install into the socket in only one direction.

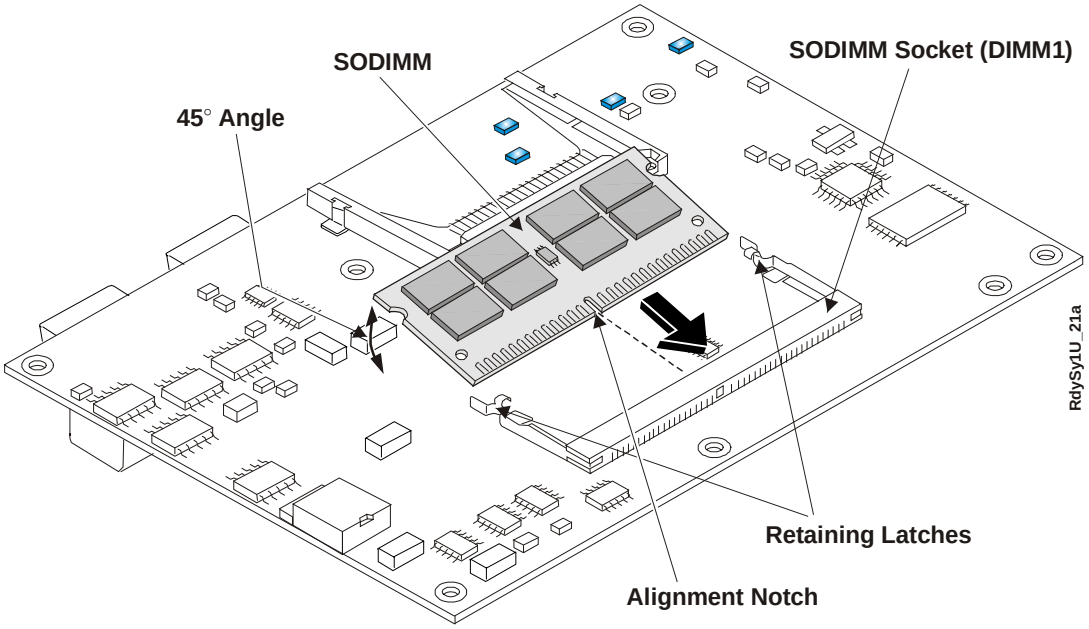


Figure 2-14. Installing SODIMM into Socket

12. Press the edges of the SODIMM down between the latches, until the latches snap into place. See Figure 2-14.

    The latches should open to accept the SODIMM without any resistance. If you encounter any resistance, you may not have inserted the SODIMM far enough into the socket.

13. If the retaining latches do not close completely on the SODIMM, remove it and repeat Steps 10 to 12.

14. Reinstall the ReadyBoard model into the ReadySystem 1U enclosure.

    Refer to the *Installing the ReadyBoard* procedure for more information.

15. Reconnect the cables to the ReadyBoard model.

    Refer to *Connecting the Cables* procedure for more information.

16. Restore power to the ReadySystem and observe the boot screen for new memory recognition.

    If the system does not boot or there is a problem recognizing the new memory, the new SODIMM could be defective or the SODIMM was not properly installed or recognized.

CAUTION	Depending on BIOS Setup, some ReadyBoard products will power on as soon as you connect DC power to the system.

Appendix A Technical Support

Ampro Computers, Inc. provides a number of methods for contacting Technical Support listed in the Table A-1 below. Requests for support through the Virtual Technician are given the highest priority, and usually will be addressed within one working day.

- Ampro Virtual Technician – This is a comprehensive support center designed to meet all your technical needs. This service is free and available 24 hours a day through the Ampro web site at http://ampro.custhelp.com. This includes a searchable database of Frequently Asked Questions, which will help you with the common information requested by most customers. This is a good source of information to look at first for your technical solutions. However, you must register online before you can login to access this service.
- Personal Assistance – You may also request personal assistance by going to the "Ask a Question" area in the Virtual Technician. Requests can be submitted 24 hours a day, 7 days a week. You will receive immediate confirmation that your request has been entered. Once you have submitted your request, you must log in to go to the "My Stuff" area where you can check status, update your request, and access other features.
- Embedded Design Resource Center – This service is also free and available 24 hours a day at the Ampro web site at http://www.ampro.com. However, you must be registered online before you can log in to access this service.

  The Embedded Design Resource Center was created as a resource for embedded system developers to share Ampro's knowledge, insight, and expertise gained from years of experience. This page contains links to White Papers, Specifications, and additional technical information.

Table A-1. Technical Support Contact Information

Method	Contact Information
Virtual Technician	http://ampro.custhelp.com
Web Site	http://www.ampro.com
Standard Mail	Ampro Computers, Incorporated 5215 Hellyer Avenue San Jose, CA 95138-1007, USA

Appendix B System Overview

This system overview presents general information about the ReadySystem 1U enclosure (ReadyBox 1U) and the EPIC Architecture. After reading this chapter you should understand:

- EPIC architecture
- ReadyBox 1U features, including I/O Panel features and connectors
- ReadyBox 1U Specifications
- ReadyBox 1U mounting dimensions

EPIC Architecture

In 2004, five companies collaborated to fill the void between the EBX size and the PC/104 size with a new industry standard form factor (115 mm x 165 mm, or ≈ 4.5" x 6.5") called "Embedded Platform for Industrial Computing (EPIC)." The EPIC standard principally defines physical size, mounting hole pattern, and power connector locations. It does not specify processor type or electrical characteristics. There are recommended connector placements for serial/parallel, ethernet, graphics, and memory expansion, including an optional location for PC card (PCMCIA) expansion. This embedded single board computer (SBC) standard ensures that embedded system OEMs can standardize their designs and that embedded computing solutions can be designed into even more space constrained environments than ever before.

The EPIC standard boasts the same highly flexible and adaptable system expansion as EBX, easily allowing addition of modular functions such as USB 2.0, IEEE 1394 (Firewire), or wireless networking not usually contained in standard product offerings.

The EPIC standard also brings stability to the mid-sized embedded board market and offers OEMs assurance that a wide range of products will be available from multiple sources – now and in the future. The EPIC specification is freely available to all interested companies, and may be used without licenses or royalties. For further technical information on the EPIC standard, visit the web site at http://www.epic-sbc.org. See Figure 2-1.

Product Description

The ReadyBox 1U is a small enclosure (1U) for Ampro's ReadyBoard products and will accept any Ampro ReadyBoard SBC.

The ReadyBox 1U is particularly well suited to embedded applications and meets the size, power consumption, temperature range, quality, and reliability demands of many embedded systems.

ReadyBox 1U Features

- Compact size
- Quiet operation
- Compatibility with any Ampro ReadyBoard SBC
- ReadyBoard I/O modified to a single I/O panel
- Compatibility with any capacity 2 ½" Hard Disk Drive

- Mechanical
  - Flexible mounting – benchtop (surface)
  - Rack mounting (optional)
  - All cabling provided internally
- Certification
  - Designed for EMI standards
  - Designed for UL/CSA/CE approval (depends on the exact system assembled)
- Power
  - AC to DC power adapter (optional)
  - Power On/Off switch
  - DC power screw-type coaxial input connector

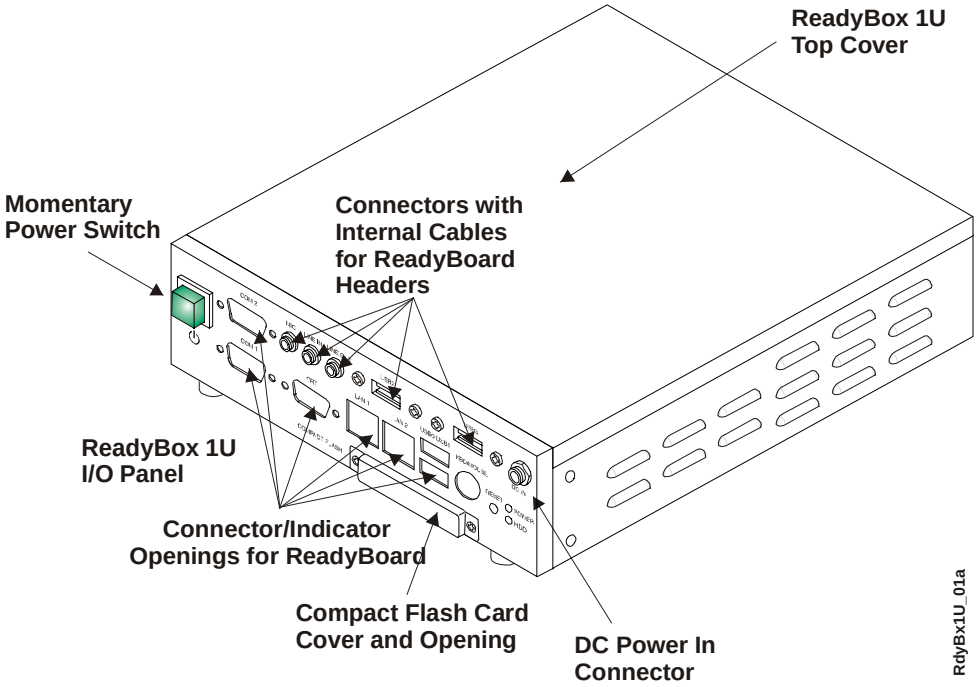


Figure B-1. ReadyBox 1U Enclosure

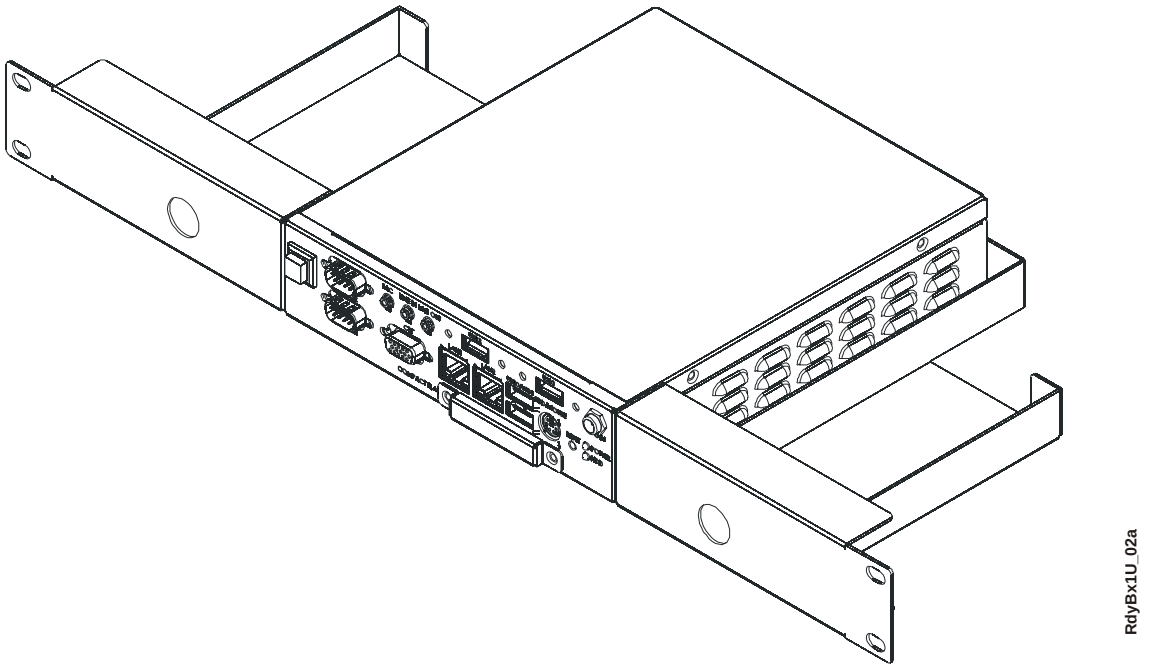


Figure B-2. Optional Rack-Mount Hardware (Installed)

I/O Panel Description

Table B-1 describes the connectors or controls on the I/O panel provided with the ReadyBox 1U shown in Figure B-3.

Table B-1. Installed Connectors or Controls

Control/Connector	Description
Power Switch	This momentary push button Power Switch controls DC power and has an internal cable and connector. The integrator must connect the 2-wire, 5-pin connector to the ReadyBoard at the Utility connector.
DC IN	This 2-pin coaxial connector is connected to the internal DC regulator and accepts 12 or 24 VDC, +/- 5% from an AC-to-DC converter (brick power supply).
Audio: MIC, Line In, Line Out	These two 3-pin connectors and one 2-pin connector (MIC) with respective cable are provided with the ReadyBox 2U. The integrator must connect the cable to the Audio In/Out connector on the ReadyBoard.
USB 2 & 3	These two 4-pin connectors with the respective cable are provided with the ReadyBox 1U. The integrator must connect the cable to the ReadyBoard USB header.
Compact Flash Cover and Slot	This compact flash cover and slot (not shown) protects the compact flash card if installed, and ensures good EMI shielding for the ReadyBox 1U.

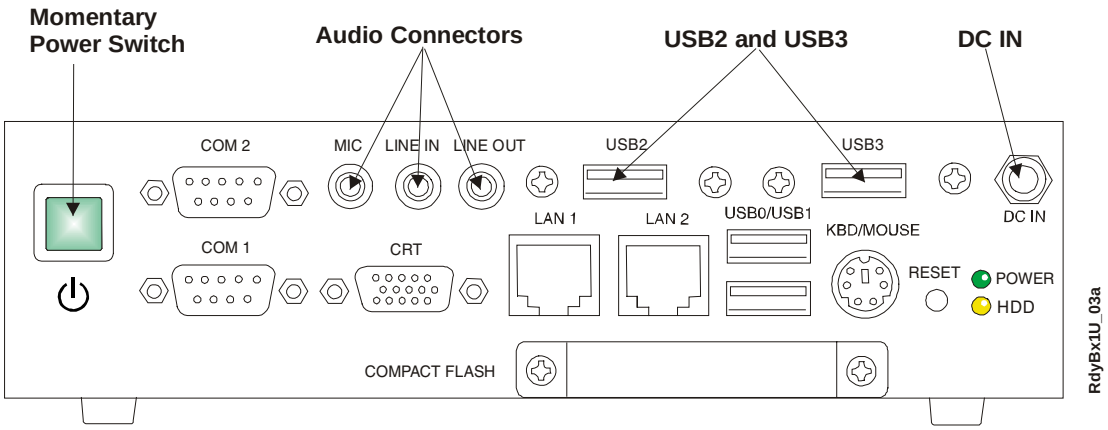


Figure B-3. I/O Panel Controls and Connectors (Front view)

Table B-2 describes the I/O panel access openings for connector, control, or indicators provided with the ReadyBoard SBC shown in Figure B-4.

Table B-2. Connectors or Control/Indicator I/O Panel Openings

Access Opening	Description
Power-On LED	This power-on indicator is provided on the ReadyBoard.
HDD Activity LED	This IDE activity indicator shows when there is I/O activity for the IDE hard drive or compact flash card and is provided on the ReadyBoard.
Reset Switch	This reset switch is provided on the ReadyBoard. Pressing the Reset switch supplies a ground signal on the reset line causing a hard reset.
Keyboard/Mouse	This 6-pin single PS/2 Keyboard/Mouse connector is provided on the ReadyBoard. It requires a dual PS/2 output cable provided in the ReadyBoard SBC QuickStart kit.
USB 0 & 1	These two 4-pin USB type A connectors are provided on the ReadyBoard.
LAN 1 (Ethernet 1)	This 8-pin (RJ45) connector is provided on the ReadyBoard.
LAN 2 (Ethernet 2)	This 8-pin or 10-pin (RJ45) connector is provided on the ReadyBoard.
Video (CRT VGA)	This 15-pin (DB15) connector is provided on the ReadyBoard.
COM 1 & COM 2 (Serial 1 & Serial 2)	These two 9-pin (DB9) connectors are provided on the ReadyBoard.
Compact Flash Socket	The compact flash socket (not shown) is provided on the underside of the ReadyBoard and accepts the compact flash card, if installed, through the opening at the bottom of the I/O panel of the ReadyBox 1U.

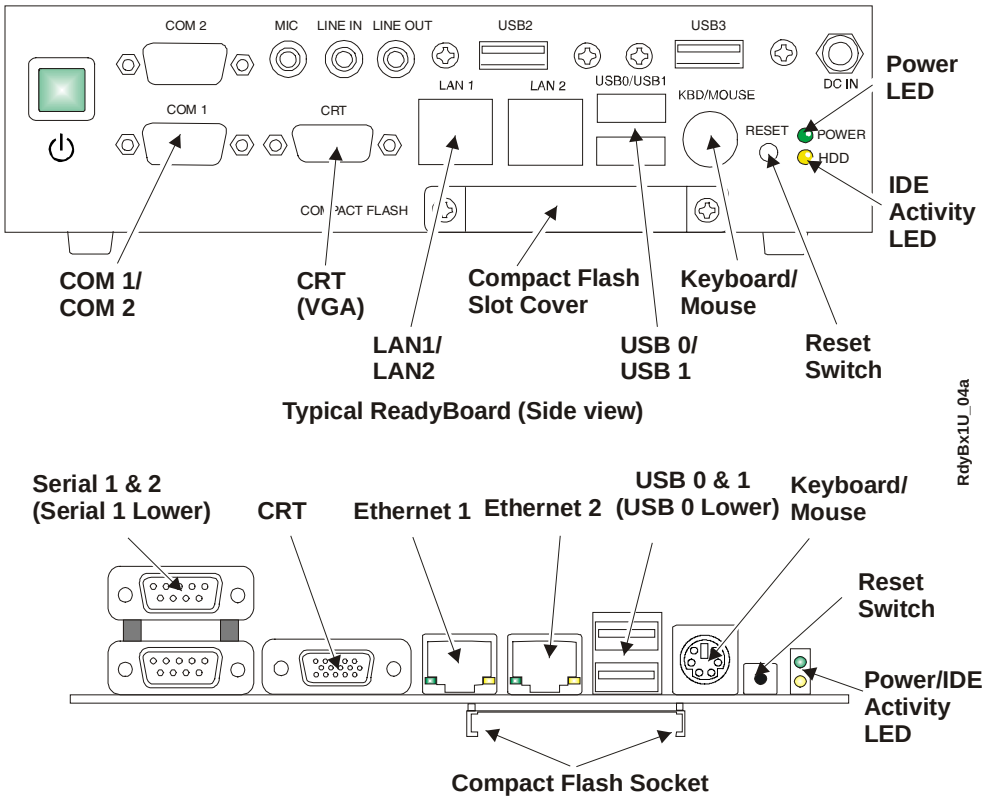


Figure B-4. I/O Panel Access Openings (Front view)

Power/IDE LED Definitions

Table B-3 provides the LED colors and definitions for the Power and IDE drive activity LEDs that are part of the installed ReadyBoard and Figure B-3 shows the locations. Refer to the specific ReadyBoard SBC for the Ethernet LED activity.

Table B-3. Power/IDE Activity LED Indicators

LED	On	Off
Power LED	**Steady Green** = **Power On**	**Steady Off** = **Power Off**
IDE Activity LED	**Flashing Yellow** = **IDE activity** (2 ½" IDE drive or Compact flash)	**Steady Off** = **No IDE** activity

Specifications

Environmental Specifications

Table B-4 provides the most efficient operating and storage condition ranges required for the ReadyBoard SBC installed into the ReadyBox 1U.

Table B-4. Environmental Requirements

Parameter	Conditions
Temperature	
Operating	+0° to +45°C (32° to +122°F)
Storage	–20° to +75°C (–4° to +167°F)
Humidity	
Operating	5% to 95% relative humidity, non-condensing
Non-operating	5% to 95% relative humidity, non-condensing

Power Specifications

Table B-5 lists the power requirements for the ReadyBox 1U.

Table B-5. Power Requirement

Parameter	Description
Input Type	+12VDC +/-5% or +24VDC +/-5%

Physical Specifications

Table B-6 gives the physical dimensions of the ReadyBox 1U as shown in Figures B-5 and B-6, and the mounting dimensions in Figures B-7 through B-12.

Table B-6. Weight and Footprint Dimensions

Parameters	Measurements (Enclosure Only)	Additional Measurements
Weight	0.89 kg (1 lb. 15.6 oz.)	Weight of enclosure without any ReadyBoards
Height	44 mm (1.73")	52 mm (2.045") with plastic feet
Width	186 mm (7.32")	481.8 mm (18.97") with rack mounting attachments
Depth	209.4 mm (8.24")	

Mechanical Specifications

Figures B-5 through B-10 show the ReadyBox 1U enclosure dimensions and mounting dimensions.

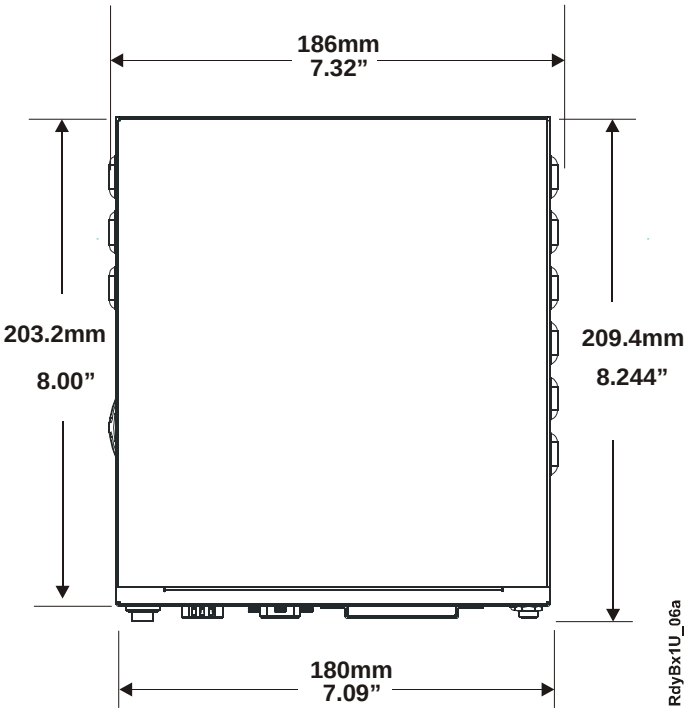


Figure B-5. Width and Depth Dimensions (Top view)

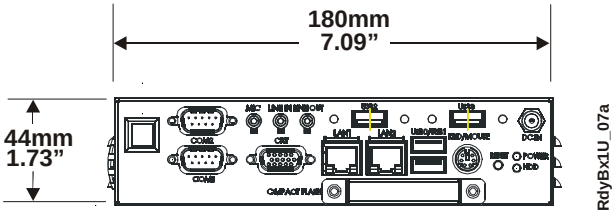


Figure B-6. Width and Height Dimensions (Front view)

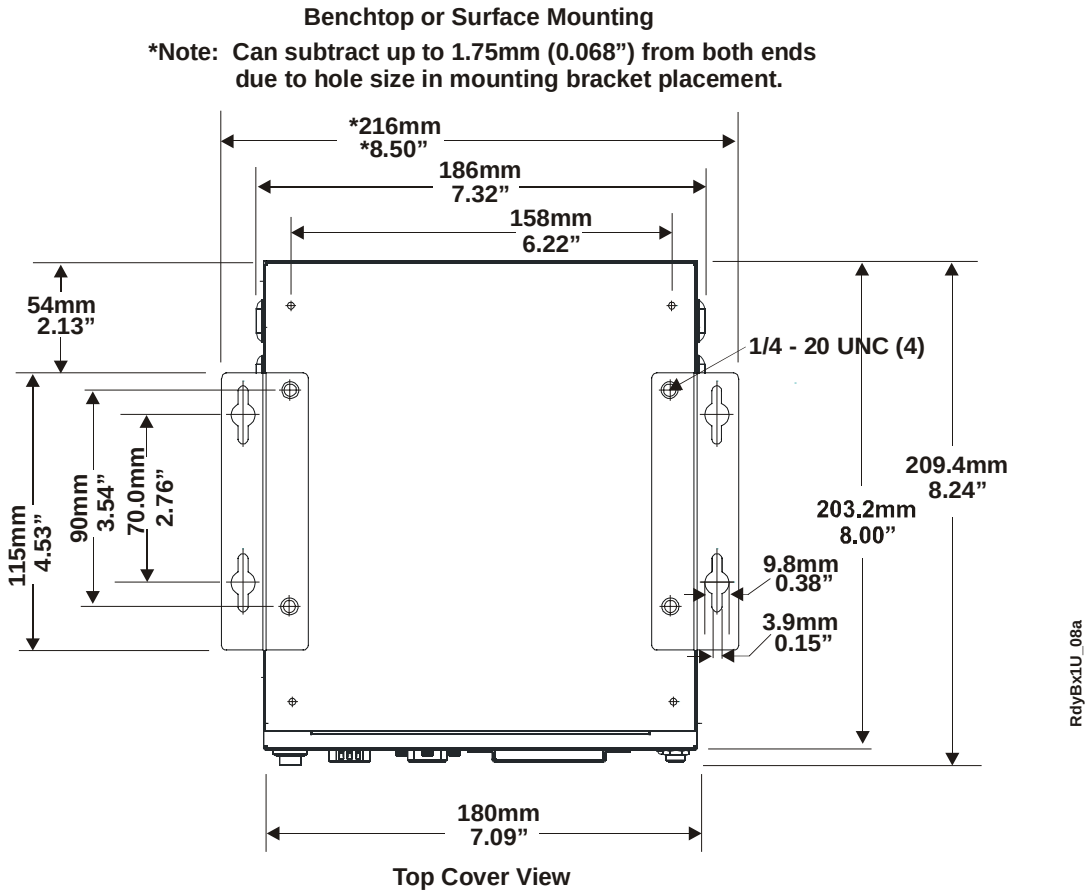


Figure B-7. Benchtop or Surface Mounting Dimensions (Top View)

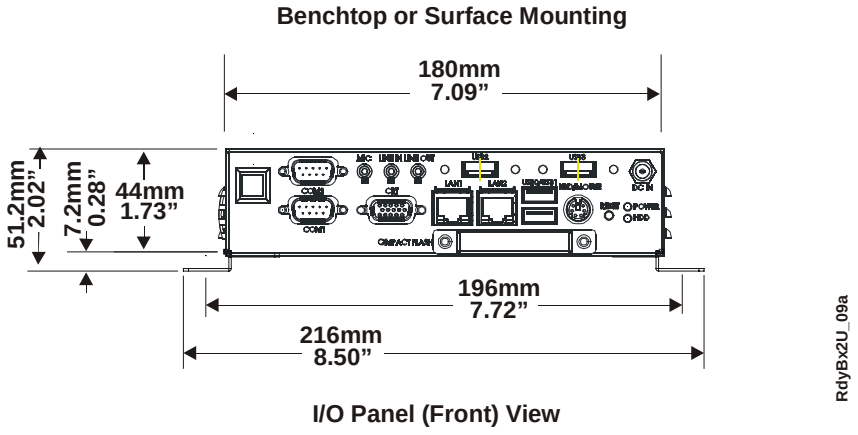


Figure B-8. Benchtop or Surface Mounting Dimensions (Front View)

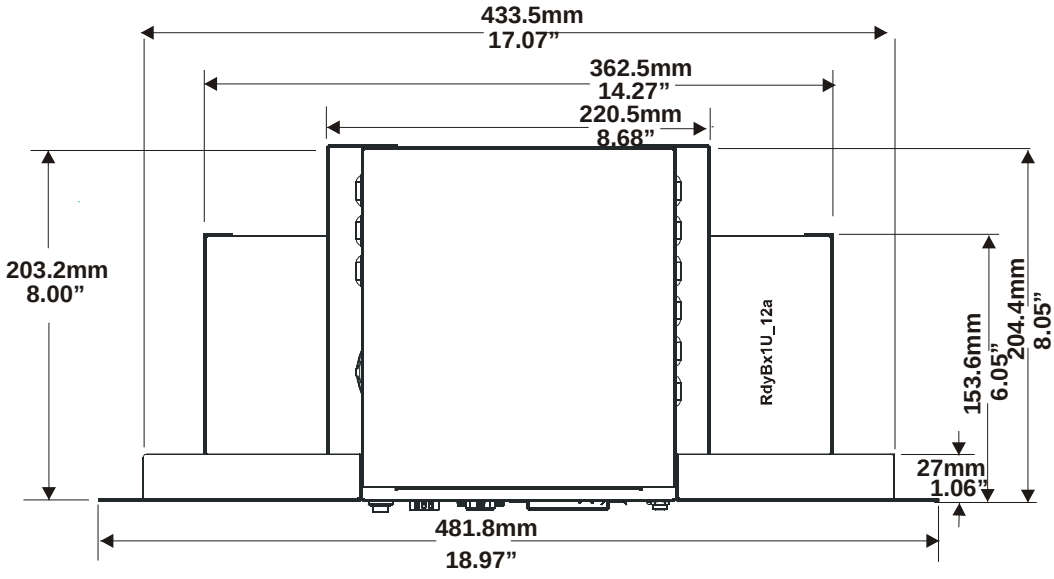


Figure B-9. Optional Rack-Mounting Dimensions (Top View)

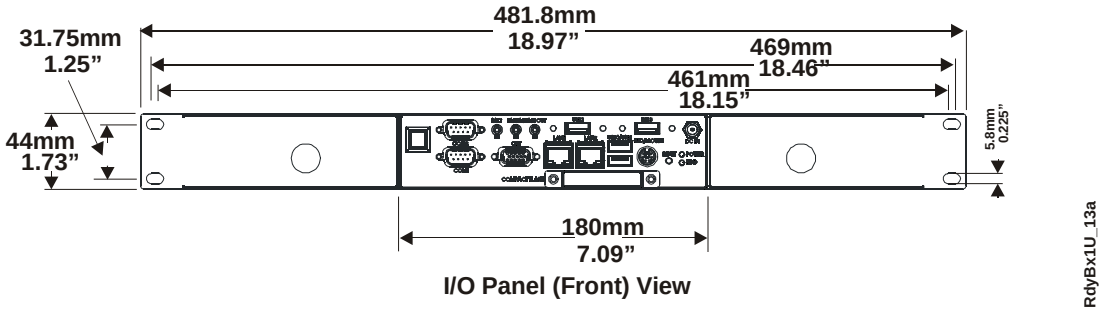


Figure B-10. Optional Rack-Mounting Dimensions (Front View)

Mounting and Cover Location

Figures B-11 and B-12 provide an illustration of the optional rack mounting and an illustration of the top cover location. The four optional plastic feet with screws are also shown in Figure B-12.

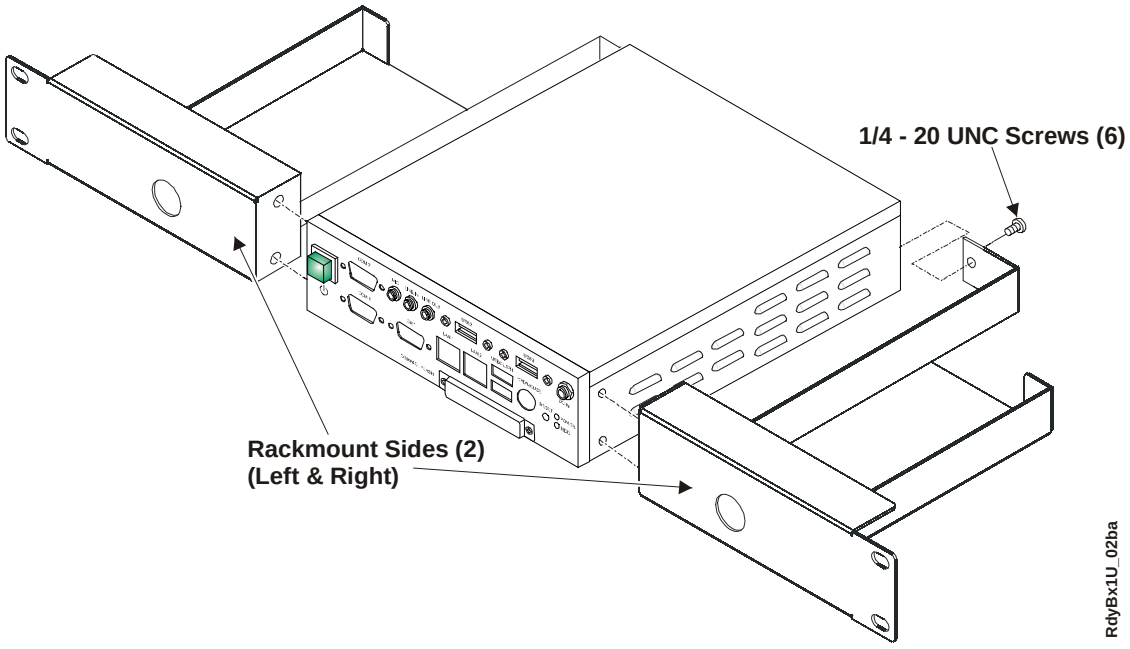


Figure B-11. Rack Mounting Hardware

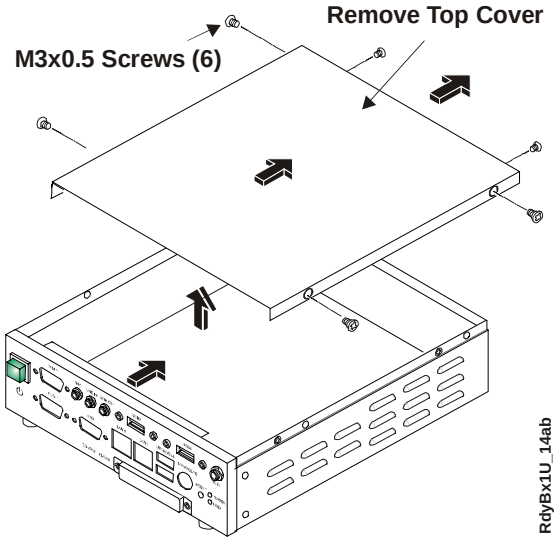


Figure B-12. Removing Top Cover

NOTE	Slide the top cover to the rear as shown in Figure B-12 before lifting the top cover off the enclosure.